Wireless Control Message Protocol

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1. Scope

The Transport layer protocol in the WAP architecture consists of the Wireless Transaction Protocol (WTP) and the Wireless Datagram Protocol (WDP). The WDP layer operates above the data capable bearer services supported by the various network types. As a general datagram service, WDP offers a consistent service to the upper layer protocols (Security, Transaction and Session) of WAP and communicates transparently over one of the available bearer services.

This document specifies the error reporting mechanism for WDP datagrams, the Wireless Control Message Protocol (WCMP). WCMP contains control messages that resemble the Internet Control Message Protocol (ICMP) [RFC792] [RFC2463] messages. WCMP can also be used for diagnostics and informational purposes.

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2. References

2.1. Normative References

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[FLEX] FLEX Protocol Specification Document, Motorola.

[FLEXsuite] FLEXsuite™ of Enabling Protocols, Motorola.

[GSM0290] ETSI European Digital Cellular Telecommunication Systems (phase 2) : Unstructured Supplementary Service Data(USSD) - stage 1 (GSM 02.90). URL:http://www.etsi.org/

[GSM0390] ETSI European Digital Cellular Telecommunication Systems (phase 2) : Unstructured Supplementary Service Data(USSD) - stage 2 (GSM 03.90). URL:http://www.etsi.org/

[GSM0490] ETSI European Digital Cellular Telecommunication Systems (phase 2) : Unstructured Supplementary Service Data(USSD) - stage 3 (GSM 04.90). URL:http://www.etsi.org/

[GSM0340] ETSI European Digital Cellular Telecommunication Systems (phase 2+) : Technical realisation of the Short Message Service (SMS) Point-to-Point (P) (GSM 03.40 version 7.1.0 Release 1998). URL:http://www.etsi.org/

[GSM0260] ETSI European Digital Cellular Telecommunication Systems (phase 2+) : General Packet Radio Service (GPRS) - stage 1 (GSM 02.60). URL:http://www.etsi.org/

[GSM0360] ETSI European Digital Cellular Telecommunication Systems (phase 2+) : General Packet Radio Service (GPRS) - stage 2 (GSM 03.60). URL:http://www.etsi.org/

[GUTS] TIA/EIA-136-750: General UDP Transport Teleservice (GUTS)

[Mobitex] Mobitex Interface Specification, rev R4A, document number LZY 232 105, especially the Network Layer section. It can be ordered at http://www.ericsson.se/wireless/products/mobsys/mobitex/subpages/mdown/mdownmi.shtml

[ReFLEX] ReFLEX Protocol Specification Document, Motorola.

[RFC768] "User Datagram Protocol". J. Postel. August 1980. URL:http://www.ietf.org/rfc/rfc768.txt

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[RFC2119] "Key words for use in RFCs to Indicate Requirement Levels". S. Bradner. March 1997. URL:http://www.ietf.org/rfc/rfc2119.txt

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[RFC2460] "Internet Protocol, Version 6 (IPv6) Specification". S. Deering(Cisco), R. Hinden(Nokia). December 1998. URL:http://www.ietf.org/rfc/rfc2460.txt

[RFC2463] "Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 (IPv6) Specification". A. Conta, S. Deering. December 1998. URL:http://www.ietf.org/rfc/rfc2463.txt

[TET 392-1] ETSI Radio Equipment and System (RES); Terrestial Trunked Radio (TETRA); Voice plus Data (V+D); Part 1: General Network Design (ETS 300 392-1). URL:http://www.etsi.org/

[TET 392-2] ETSI Radio Equipment and System (RES); Terrestial Trunked Radio (TETRA); Voice plus Data (V+D); Part 2: Air Interface (AI) (ETS 300 392-2). December 1999. URL:http://www.etsi.org/

[TET SDSTL] ETSI Radio Equipment and System (RES); Terrestial Trunked Radio (TETRA); Voice plus Data (V+D); SDS Transport Layer. URL:http://www.etsi.org/

[TIAEIA-637] TIA/EIA-637-A: Short Message Service for Spread Spectrum Systems

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[WAPARCH] "Wireless Application Protocol Architecture Specification". WAP Forum™. WAP-100-WAPArch-19980430-a. URL:http://www.wapforum.org/

[WDP] Wireless Datagram Protocol Specification 30-April-1998

2.2. Informative References

[IS07498] ISO 7498 OSI Reference Model

[TCP/Ipill3] W. Richard Stevens "TCP/IP Illustrated, Volume 3", Addison-Wesley Publishing Company Inc., 1996, ISBN 0-201-63495-3

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3. Terminology and Conventions

3.1. Conventions

The key words “MUST”, “MUST NOT”, “REQUIRED”, “SHALL”, “SHALL NOT”, “SHOULD”, “SHOULD NOT”, “RECOMMENDED”, “MAY”, and “OPTIONAL” in this document are to be interpreted as described in [RFC2119].

All sections and appendixes, except “Scope”, are normative, unless they are explicitly indicated to be informative.

3.2. Definitions

IS-637 SMS

IS-637 SMS [TIAEIA-637] provides a short message service in IS-95 CDMA networks.

3.3. Abbreviations

ETSI	European Telecommunication Standardisation Institute
IE	Information Element
IP	Internet Protocol
LSB	Least significant bits
MAN	Mobitex Subscription Number
MPAK	Mobitex Network Layer Packet
MSISDN	Mobile Subscriber ISDN (Telephone number or address of device)
MS	Mobile Station
MSB	Most significant bits
SDS	Short Data Service
SMSC	Short Message Service Centre
SMS	Short Message Service
TCP/IP	Transmission Control Protocol/Internet Protocol
TETRA	Terrestrial Trunked Radio
UAR	Uniform Addressing and Routing
UDH	User-Data Header (see [GSM0340])
UDP	Unreliable Datagram Protocol
USSD	Unstructured Supplementary Service Data
USSDC	Unstructured Supplementary Service Data Centre
WAE	Wireless Application Environment
WAP	Wireless Application Protocol
WDP	Wireless Datagram Protocol
WSP	Wireless Session Protocol
WTP	Wireless Transaction Protocol

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4. WCMP Architectural Overview

Figure 4-1 shows a general model of the WAP protocol architecture and how WCMP fits into that architecture.

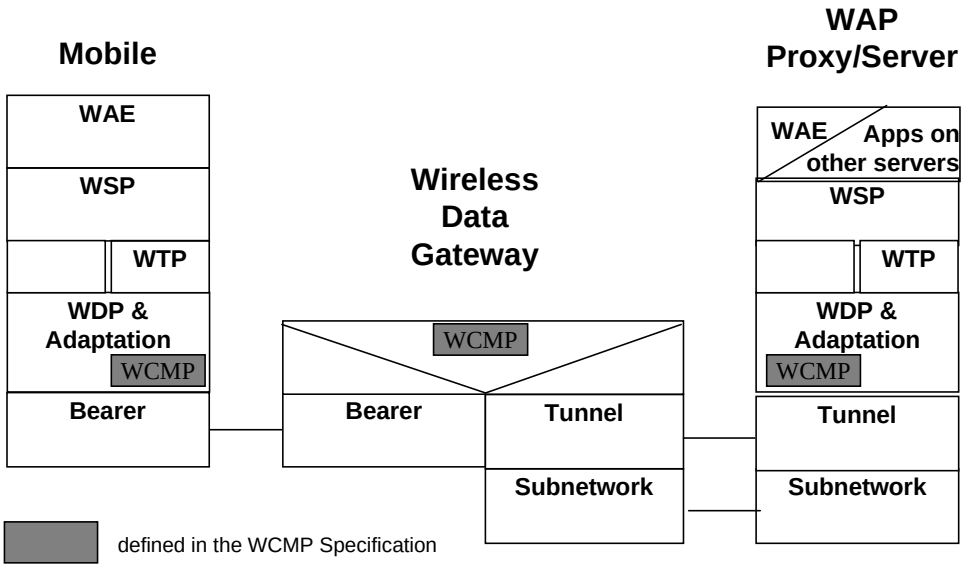

Figure 4-1 WCMP in the WAP Architecture

The Transport layer protocol in the WAP architecture is the Wireless Datagram Protocol (WDP). The WDP protocol operates above the data capable bearer services supported by multiple network types. WDP offers a consistent but unreliable service to the upper level protocols of WAP and communicates transparently over one of the available bearer services.

WCMP is used by WDP nodes and Wireless Data Gateways to report errors encountered in processing datagrams. WCMP can also be used for informational and diagnostic purposes.

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5. WCMP Protocol Description

5.1. General

The Wireless Control Message Protocol (WCMP) is used in environments that do not provide an IP bearer. WCMP is used by WDP nodes and Wireless Data Gateways to report errors encountered in processing datagrams. WCMP messages are usually generated by the WDP layer, the management entity or a higher layer protocol. WCMP can also be used for informational and diagnostic purposes.

WCMP error message MUST NOT be generated in response to another WCMP error message. To report an error related to a fragmented datagram, more than one WCMP message MUST NOT be sent. Additionally, one WCMP message MUST fit into a single bearer level fragment.

The Wireless Control Message Protocol (WCMP) provides an efficient error handling mechanism for WDP, resulting in improved performance for WAP protocols and applications.

Please note that in case of certain bearers (eg GSM-SMS) it is very easy to forge and send WCMP messages with malicious intent. Although they are meant to improve performance in case of network errors, all implementation should be very careful in the actions taken when they receive a WCMP message. For example when receiving a Destination Unreachable message, it is not recommended to abort all outstanding transactions immediately to that destination, but wait all timers to expire and do the abort at that time.

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5.2. WCMP Conformance

There is a minimum set of WCMP features that can be implemented to ensure that the implementation will be able to interoperate. Appendix A details these features which are also summarised in the table below.

WCMP Message	WCMP Type	WCMP Code	Mandatory / Optional		Note
Destination Unreachable	**51**				
• No route to destination		0	WDP Node	N/A	
			Wireless Data Gw	O	
• Communication administratively prohibited		1	WDP Node	N/A	
			Wireless Data Gw	O	
• Address unreachable		3	WDP Node	N/A	
			Wireless Data Gw	O	
• Port unreachable		4	WDP Node	M	
			Wireless Data Gw	N/A	
Parameter Problem	**54**				
• Erroneous header field		0	WDP Node	O	
			Wireless Data Gw	O	
Message Too Big	**60**	0	WDP Node	M	
			Wireless Data Gw	N/A	
Reassembly Failure	**61**				
• Reassembly time exceeded		1	WDP Node	O	
			Wireless Data Gw	N/A	
• Buffer Overflow		2	WDP Node	O	
			Wireless Data Gw	N/A	
Echo Request	**178**	0	WDP Node	O	
			Wireless Data Gw	N/A	
Echo Reply	**179**	0	WDP Node	M	1)
			Wireless Data Gw	N/A	

Note 1) WCMP implementations MAY impose restrictions on the quantity of Echo Reply messages generated, to protect for example from network overload or denial of service attacks.

5.3. WCMP in IP Networks

In IP based networks, the functionality of the WCMP is implemented by using the Internet Control Message Protocol (ICMP). ICMP is defined in [RFC792] for IPv4 and [RFC2463] for IPv6.

At the time of publication, the known IP-based bearer networks that will use ICMP are GSM CSD, GSM GPRS, TDMA CSD, CDPD, CDMA CSD, iDEN CSD, iDEN Packet Data, CDMA Packet Data and TETRA Packet Data.

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5.4. WCMP in Non-IP Networks

5.4.1. WCMP in GSM SMS

For GSM SMS, the User Data Header (UDH) framework as defined in [GSM0340] is used. The WCMP messages are carried in the UDH in an Information Element. The WCMP Information Element Identifier (IEI) is an octet with value 0x09. The WCMP Information Element data octets shall be coded as specified in section 5.5.

The WDP datagram protocol operates on top of the SMS Transfer Layer and has a need to report errors unique to the datagram layer, end to end. This is done by using WCMP. Error messages supported by WCMP deal e.g. with erroneous port numbers, failures when re-assemble a segmented message and parameter errors in the WDP header. These datagram related errors occur above the SMS transfer layer.

Failures to transfer or process a short message at the SMS transfer layer are reported using the SMS-SUBMIT-REPORT, SMS-DELIVER-REPORT, and SMS-STATUS-REPORT protocol data units. These messages may trigger the SMSC to generate WCMP messages if needed.

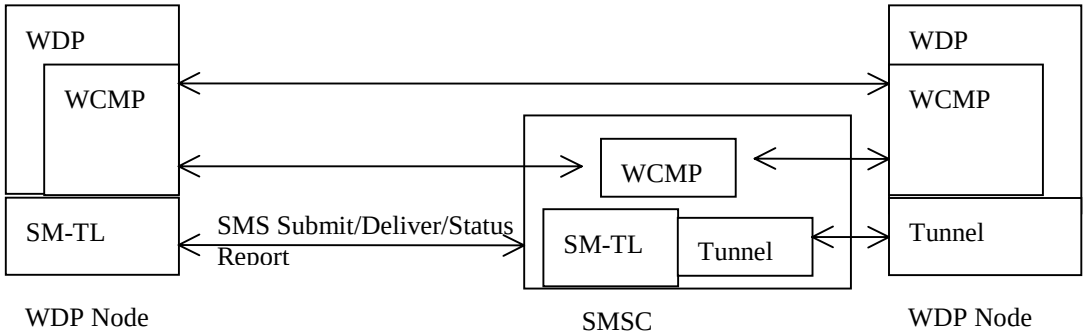

Figure 5-1 Error Reporting Protocols for WDP and the Short Message Transfer Layer

The complete list of SMS transfer layer failure causes can be found in [GSM0340].

5.4.2. WCMP in GSM USSD

For GSM USSD, the User Data Header (UDH) framework as defined in [GSM0340] is used. The WCMP messages are carried in the UDH in an Information Element. The WCMP Information Element Identifier (IEI) is an octet with value 0x09. The WCMP Information Element data octets shall be coded as specified in section 5.5.

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5.4.3. WCMP in FLEX™ and ReFLEX™

ReFLEX subscriber units that are operating in a two-way mode on a two-way paging network MUST comply with the WCMP description as given below. However, all FLEX devices and ReFLEX devices that operate a one-way channel will not be able to cooperate in a WCMP error message scheme.

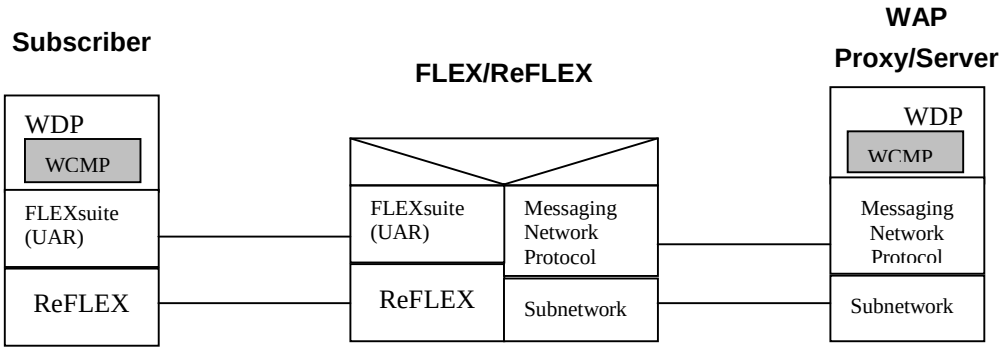

Figure 5-2 Error Reporting Protocols for WDP in ReFLEX

The WCMP message is carried in the FLEXsuite Uniform Addressing and Routing (UAR) protocol as specified [FLEXsuite]. The table below illustrates the structure of the UAR protocol.

Field	WDP Usage
UAR Header	M
TO Address	O
FROM Address	O
Content Type	[application/x-wap.wcmp]
Cyclic Redundancy Check	O
Data	WCMP message

Figure 5-3 Fields for FLEXsuite UAR Protocol

The length of the **UAR Header** is one byte. It is used to identify the FLEXsuite message as a UAR message.

The **TO Address** and **FROM Address** fields MAY be used in systems with more than one WAP Proxy/Server. The content of the TO and FROM address fields is specific to the network protocol used between the WAP Proxy/Server and the FLEX/ReFLEX network. In UAR protocol messages that are being sent from the wireless device, the **TO Address** field MAY be specified to allow for more than one WAP proxy/gateway to be unambiguously identified. Conversely, in UAR protocol messages that are being sent to a wireless device, the **FROM Address** field MAY be specified to allow for more than one WAP proxy/gateway to be unambiguously identified.

The **Content Type** field identifies that the UAR Data field contains a WCMP packet.

The **Cyclic Redundancy Check** is optional and helps to detect errors in the **UAR Header**, **TO Address**, **FROM Address**, and **Content Type** fields.

5.4.4. WCMP in CDMA SMS

WCMP messages are carried in the User Data subparameter of IS-637 SMS point-to-point messages. An *SMS Submit Message* MUST be used to send a WCMP message from a mobile station. An *SMS Deliver Message* MUST be used to deliver a WCMP message to a mobile station.

SMS messages containing WCMP messages use the WAP teleservice defined in [TIAEIA-637].

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The value of the MESSAGE_ID field MUST be set according to the rules defined for datagrams in CDMA SMS [WDP].

The CHARi fields of the User Data subparameter in a WCMP SMS message contain the WCMP message. The structure of the CHARi fields is as follows:

Field	Length (bits)
MSG_TYPE	8
WCMP_MESSAGE	(NUM_FIELDS – 1) * 8

MSG_TYPE **Message Type**

This field MUST be set to '00000001', to indicate that this is a WCMP message. This field distinguishes WCMP messages from other WAP messages such as WDP messages.

WCMP_MESSAGE **WCMP Message Bytes**

The WCMP end point issuing this SMS message MUST fill this field with the WCMP message. The NUM_FIELDS field of the User Data subparameter MUST be set to the number of bytes in the message plus 1.

5.4.5. WCMP in TDMA R-Data

5.4.5.1. WCMP in TDMA R-Data using GHOST

See section 5.4.1.

5.4.5.2. WCMP in TDMA R-Data using GUTS

To be defined later.

5.4.6. WCMP in TETRA SDS

The WCMP utilizes the SDS Transport Layer (SDS-TL) when sending control messages over the TETRA SDS bearer service. See [TET SDSTL] for more information on SDS-TL.

The SDS embeds the WCMP messages in the "User defined data-4" field. See [TET 392-2] for more information on the SDS message format. In the User defined data-4 field, the WCMP message is preceded by a Protocol Identifier, which is added by the SDS-TL. This element identifies the WCMP as a service user. A WCMP Protocol Identifier with the value 0x05 [TET 392-2] has been reserved for this purpose from ETSI.

The SDS-TL does not use the standard header format for sending WAP messages. The protocol identifier is the only SDS-TL information element remaining in the User defined data-4 field.

5.4.7. WCMP in Mobitex

WCMP uses a Mobitex MPAK with a WCMP-specific protocol identifier to transfer control messages over the Mobitex bearer service.

The WCMP messages are embedded in an MPAK according to the following picture. The WCMP protocol is specified by using a WCMP-specific identifier in the MPAK protocol.

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5.4.7.1. Encapsulation of WCMP in Mobitex MPAKs

When WCMP-messages are to be sent over a Mobitex bearer, they SHALL be put into Mobitex Packets (MPAKs). The MPAK SHALL be initialised as described below. For further information on the MPAK format, see [Mobitex]. **Note!** Bit 0 is most significant bit and bit 7 least significant bit. This is different from the numbering in [Mobitex] where the leftmost bit is numbered 7 and the rightmost 0. The leftmost bit is most significant in both specs however.

Bit/Oct	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
1	SENDER (Mobitex MAN)							
2								
3								
4	ADDRESSEE(Mobitex MAN)							
5								
6								
7	0	0	0	0	0	0	0	0
8	0	0	0	0	0	1	0	0
9	Mobitex Time (Not Used)							
10								
11								
12	WAP/WCMP-Specific Protocol Identification (0x0C)							
13	*WCMP message.*							

The **SENDER** field shall contain the Mobitex MAN of the sender.

The **ADDRESSEE** field shall contain the Mobitex MAN of the addressee.

Octets 7 and 8 shall be initialised as described in the table above. For a description over the different flag settings in the MPAK protocol, see [Mobitex].

The WCMP layer should ignore the **Mobitex Time** field.

The Protocol Identification field shall be set to the identification value defined for WAP/WCMP over Mobitex (0x0C), according to [Mobitex].

The WCMP message shall be put at the end of the MPAK. Maximum number of octets that can be transferred by the MPAK protocol is 512.

5.5. WCMP Messages

5.5.1. General Message Structure

Network bit order for bit fields is “big-endian”. In other words, the left-most bit in the bit field is the most significant bit of the octet and is transmitted first followed subsequently by less significant bits. In two-byte fields, the first byte is the high order byte.

Bit/Octet	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
1	Type of Control Message							
2	Code of Control Message							
3 - N	Data Fields for WCMP (0 .. N octets)							

Figure 5-4 General Format of a WCMP Message

Different WCMP messages are identified by the Type and Code fields. The **Type** field indicates the type of the message. Its value determines the format of the remaining data. The **Code** field depends on the message type and defines the format of the **Data Fields**.

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WCMP messages are grouped into two classes, error messages and informational messages. Error messages have message types from 0 to 127, informational messages have message types from 128 to 191. Types 192 – 255 are reserved for future purposes.

WCMP Type values are different from ICMP Type values. WCMP Type values have been selected by adding 50 to the respective ICMP Type [RFC2463]. WCMP Codes are the same than in ICMP.

Message Description	*WCMP MsgType*	*WCMP Code*
Destination Unreachable	**51**	
• No route to destination		0
• Communication administratively prohibited		1
• Address unreachable		3
• Port unreachable		4
Parameter Problem	**54**	
• Erroneous header field		0
Message Too Big	**60**	0
Reassembly Failure	**61**	
• Reassembly time exceeded		1
• Buffer Overflow		2
Echo Request	**178**	0
Echo Reply	**179**	0

Figure 5-5 Types and Codes for WCMP Messages

5.5.2. Address Information Formats

The following Address Information field format MUST be used in the WCMP messages:

Bit/Octet	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
1	Address Type = GSM							
2	Address Length							
3 – N	Address Data							

If the Address Type is GSM, the Address Data MUST be coded using the semi-octet representation defined in [GSM0340].

Bit/Octet	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
1	Address Type = IPv4							
2	Address Length							
3	32 bit IP address							
4								
5								
6								

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Bit/Octet	0	1	2	3	4	5	6	7
1	Address Type = IPv6							
2	Address Length							
3	1-32 bits of IP address							
4								
5								
6								
7	33-64 bits of IP address							
8								
9								
10								
11	65-96 bits of IP address							
12								
13								
14								
15	97-128 bits of IP address							
16								
17								
18								

If the Address Type is IPv4 or IPv6, the address MUST be coded with the most significant bit first.

Bit/Octet	0	1	2	3	4	5	6	7
1	Address Type = FLEX							
2	Address Length							
3 – N	Address Data							

If the Address Type is FLEX, the Address Data MUST be coded according to [FLEX], Section 6.12, FLEX Capcodes.

Bit/Octet	0	1	2	3	4	5	6	7
1	Address Type = ReFLEX							
2	Address Length							
3	R	I	30 bit ReFLEX address					
4								
5								
6								

If the Address Type is ReFLEX, the Address Data MUST be coded according to [ReFLEX]. The I-bit identifies whether the address is a personal or information services address. The R-bit (reserved), should be set to 0.

The following Address Information field format MUST be used for WCMP messages over an IS-637 SMS [TIAEIA-637] bearer. The Address Data MUST include an Address Parameter, as defined in section 3.4.3.3 of [TIAEIA-637]. The Address Data MAY also include a Subaddress Parameter, as defined in section 3.4.3.4 of [TIAEIA-637]. If the Subaddress Parameter is included, the Address Data MUST consist of the Address Parameter octets followed by the Subaddress Parameter octets. [Note: Both parameters include a PARAMETER_LENGTH octet, which will allow the recipient of the WCMP message to break the Address Data into the two parameters.]

Bit/Octet	0	1	2	3	4	5	6	7
1	Address Type = CDMA							
2	Address Length							
3 - N	Address Data							

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Bit/Octet	0	1	2	3	4	5	6	7
1	Address Type = TETRA							
2	Address Length							
3 - N	Address Data							

If the Address Type is TETRA, the Address Data MUST be coded according to [TET 392-1], Section 7 Addressing and identities.

Bit/Octet	0	1	2	3	4	5	6	7
1	Address Type = Mobitex							
2	Address Length							
3 – N	Address Data							

If the Address Type is Mobitex, the Address Data MUST be coded according to [Mobitex].

The assigned **Address Type** values for different bearers are specified in [WDP].

5.5.3. WCMP Messages

5.5.3.1. Destination Unreachable

Bit/Octet	0	1	2	3	4	5	6	7
1	Type of Control Message							
2	Code of Control Message							
3	Destination port of original datagram							
4								
5	Originator port of original datagram							
6								
7 – N	Address Information							

Description

A Destination Unreachable message SHOULD be generated by the receiving WDP node in response to a packet that cannot be delivered to its destination for reasons other than congestion. When the reason is 'Port Unreachable', the WDP node MUST send a Destination Unreachable message.

A Destination Unreachable message SHOULD be generated by Wireless Data Gateways (e.g. SMSC, USSDC) when it cannot route the datagram to a WAP Gateway.

A WCMP message MUST NOT be generated if a packet is dropped due to congestion.

Type

51

Code

0 If the reason for the failure to deliver is lack of a matching entry in the forwarding node's routing table (e.g. in the SMSC or USSDC), the Code field is set to 0 (No Route To Destination).

1 If the reason for the failure to deliver is administrative prohibition, e.g., a node acts as a "firewall filter", the Code field is set to 1 (Communication Administratively Prohibited).

3 If there is another reason for the failure to deliver, e.g., inability to resolve the WDP destination address into a corresponding link or device address, or a link-specific problem of some sort, then the Code field is set to 3 (Address unreachable).

4 If the transport protocol (e.g. WDP) does not have a listener for a particular port, the destination node MUST send a Destination Unreachable message with Code 4 (Port Unreachable).

Address Information

The Address is the Destination Address of the original datagram.

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5.5.3.2. Parameter Problem

Bit/Octet	0	1	2	3	4	5	6	7
1	Type of Control Message							
2	Code of Control Message							
3 – N	Address Information							
N + 1	Index (Value 0 – 64)							
N + 2 – N + 65	Data From The Original Datagram (64 octets)							

Description

If a WDP node processing a packet finds a problem with a field in the WDP header such that it cannot complete processing the packet, it MUST discard the packet and SHOULD send a WCMP Parameter Problem message to the packet's source.

Type

54

Code

0 erroneous header field encountered

Address Information

The Address is the Destination Address of the original datagram.

Index

Index to point to the octet in the original datagram which caused the problem. When the index cannot point to that octet it MUST be set to zero.

Data from the Original Datagram

64 octets from the beginning of the original datagram.

5.5.3.3. Message Too Big

Bit/Octet	0	1	2	3	4	5	6	7
1	Type of Control Message							
2	Code of Control Message							
3	Destination port of original datagram							
4								
5	Originator port of original datagram							
6								
7 – N	Address information							
N + 1	Maximum message size in octets							
N + 2								

Description

The Message Too Big message MUST be used to inform the sending party about buffer size limitations of the receiver. It MUST be used when the first datagram of a segmented message is received and there is not enough buffer space for the whole message.

Type

60

Code

0

Address Information

The Address is the Destination Address of the original datagram.

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5.5.3.4. Reassembly Failure

Bit/Octet	0	1	2	3	4	5	6	7
1	Type of Control Message							
2	Code of Control Message							
3	Destination port of original datagram							
4								
5	Originator port of original datagram							
6								
7 – N	Address Information							

Description

If a node reassembling a fragmented datagram cannot complete the reassembly it MAY send a Reassembly Failure message. The node SHOULD discard the datagram.

If the first fragment of a segmented message is not available, the Reassembly Failure message SHOULD NOT be sent, but all fragments for the given message SHOULD be silently discarded.

Type

61

Code

1 Fragment reassembly time exceeded

2 Buffer overflow

Address Information

The Address is the Destination Address of the original datagram.

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5.5.3.5. WCMP Echo Request/Reply

Bit/Octet	0	1	2	3	4	5	6	7
1	Type of Control Message							
2	Code of Control Message							
3	Identifier number							
4								
5	Sequence number							
6								
7 – N	Data							

Description

A WDP node MUST implement a WCMP Echo function that receives Echo Requests and sends corresponding Echo Replies. A node SHOULD also implement an application-layer interface for sending Echo Requests and receiving Echo Replies, for diagnostic purposes.

The data received in the WCMP Echo Request message MUST be returned entirely and unmodified in the WCMP Echo Reply message, unless the Echo Reply would exceed the MTU of the path back to the Echo requester, in which case the data is truncated to fit that path MTU.

Type

178 Echo Request

179 Echo Reply

Code

0

Identifier Number

The Identifier Number is used as an aid to match Echo Replies to this Echo Request. May be zero.

Sequence Number

The Sequence Number is used as an aid to match Echo Replies to this Echo Request. May be zero.

Data

The Data can be zero or more octets of arbitrary data.

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Appendix A. Static Conformance Requirements (Normative)

The notation used in this appendix is specified in [CREQ].

Item	Function	Reference	Status	Requirement
WCMP-C-001	WCMP in client		M	WCMP-SP-C-001 OR WCMP-SP-C-002
WCMP-SP-C-001	Does the implementation conform to ICMP	[RFC792], [RFC2463]	O	
WCMP-SP-C-002	Does the implementation conform to the general message structure of WCMP	5.4, 5.5.1	O	WCMP-GEN-C-001 AND WCMP-GEN-C-003 AND WCMP-GEN-C-006
WCMP-NE-C-001	protocol UDP endpoint	[RFC768]	O	WCMP-SP-C-001
WCMP-NE-C-002	protocol WDP endpoint	[WDP]	O	WCMP-SP-C-002 AND WCMP-GEN-C-010 AND WCMP-GEN-C-014 AND WCMP-GEN-C-016 AND WCMP-GEN-C-020 AND WCMP-GEN-C-024 AND WCMP-GEN-C-025
WCMP-GEN-C-001	WCMP message type Destination Unreachable	5.5.3.1	O	
WCMP-GEN-C-002	WCMP message type Parameter Problem	5.5.3.2	O	
WCMP-GEN-C-003	message type Message Too Big	5.5.3.3	O	
WCMP-GEN-C-004	message type Reassembly Failure	5.5.3.4	O	
WCMP-GEN-C-005	message type Echo Request	5.5.3.5	O	
WCMP-GEN-C-006	message type Echo Reply	5.5.3.5	O	
WCMP-GEN-C-007	able to generate Destination Unreachable: No Route To Destination		O	
WCMP-GEN-C-008	able to generate Destination Unreachable: Communication Administratively Prohibited		O	
WCMP-GEN-C-009	able to generate Destination Unreachable: Address Unreachable		O	
WCMP-GEN-C-010	able to generate Destination Unreachable: Port Unreachable		O	
WCMP-GEN-C-011	to generate Reassembly Failure: Reassembly time Exceeded		O	
WCMP-GEN-C-012	able to generate Reassembly Failure: Buffer Overflow		O	
WCMP-GEN-C-013	able to generate Parameter Problem: Erroneous header field		O	
WCMP-GEN-C-014	able to generate Message Too Big		O	
WCMP-GEN-C-015	able to generate Echo Request		O	
WCMP-GEN-C-016	able to generate Echo Reply		O	

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Item	Function	Reference	Status	Requirement
WCMP-GEN-C-017	able to process incoming Destination Unreachable: No Route To Destination		O	
WCMP-GEN-C-018	able to process incoming Destination Unreachable: Communication Administratively Prohibited		O	
WCMP-GEN-C-019	able to process incoming Destination Unreachable: Address Unreachable		O	
WCMP-GEN-C-020	able to process incoming Destination Unreachable: Port Unreachable		O	
WCMP-GEN-C-021	able to process incoming Reassembly Failure: Reassembly time Exceeded		O	
WCMP-GEN-C-022	able to process incoming Reassembly Failure: Buffer Overflow		O	
WCMP-GEN-C-023	able to process incoming Parameter Problem: Erroneous header field		O	
WCMP-GEN-C-024	able to process incoming Message Too Big		O	
WCMP-GEN-C-025	able to process incoming Echo Request		O	
WCMP-GEN-C-026	able to process incoming Echo Reply		O	

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Item	Function	Reference	Status	Requirement
WCMP-S-001	WCMP in server		M	WCMP-SP-S-001 OR WCMP-SP-S-002
WCMP-SP-S-001	Does the implementation conform to ICMP	[RFC792], [RFC2463]	O	
WCMP-SP-S-002	Does the implementation conform to the general message structure of WCMP	5.4, 5.5.1	O	WCMP-GEN-S-001 AND WCMP-GEN-S-003 AND WCMP-GEN-S-006
WCMP-NE-S-001	protocol UDP endpoint	[RFC768]	O	WCMP-SP-S-001
WCMP-NE-S-002	protocol WDP endpoint	[WDP]	O	WCMP-SP-S-002 AND WCMP-GEN-S-010 AND WCMP-GEN-S-014 AND WCMP-GEN-S-016 AND WCMP-GEN-S-020 AND WCMP-GEN-S-024 AND WCMP-GEN-S-025
WCMP-GEN-S-001	WCMP message type Destination Unreachable	5.5.3.1	O	
WCMP-GEN-S-002	WCMP message type Parameter Problem	5.5.3.2	O	
WCMP-GEN-S-003	message type Message Too Big	5.5.3.3	O	
WCMP-GEN-S-004	message type Reassembly Failure	5.5.3.4	O	
WCMP-GEN-S-005	message type Echo Request	5.5.3.5	O	
WCMP-GEN-S-006	message type Echo Reply	5.5.3.5	O	
WCMP-GEN-S-007	able to generate Destination Unreachable: No Route To Destination		O	
WCMP-GEN-S-008	able to generate Destination Unreachable: Communication Administratively Prohibited		O	
WCMP-GEN-S-009	able to generate Destination Unreachable: Address Unreachable		O	
WCMP-GEN-S-010	able to generate Destination Unreachable: Port Unreachable		O	
WCMP-GEN-S-011	to generate Reassembly Failure: Reassembly time Exceeded		O	
WCMP-GEN-S-012	able to generate Reassembly Failure: Buffer Overflow		O	
WCMP-GEN-S-013	able to generate Parameter Problem: Erroneous header field		O	
WCMP-GEN-S-014	able to generate Message Too Big		O	
WCMP-GEN-S-015	able to generate Echo Request		O	
WCMP-GEN-S-016	able to generate Echo Reply		O	

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Item	Function	Reference	Status	Requirement
WCMP-GEN-S-017	able to process incoming Destination Unreachable: No Route To Destination		O	
WCMP-GEN-S-018	able to process incoming Destination Unreachable: Communication Administratively Prohibited		O	
WCMP-GEN-S-019	able to process incoming Destination Unreachable: Address Unreachable		O	
WCMP-GEN-S-020	able to process incoming Destination Unreachable: Port Unreachable		O	
WCMP-GEN-S-021	able to process incoming Reassembly Failure: Reassembly time Exceeded		O	
WCMP-GEN-S-022	able to process incoming Reassembly Failure: Buffer Overflow		O	
WCMP-GEN-S-023	able to process incoming Parameter Problem: Erroneous header field		O	
WCMP-GEN-S-024	able to process incoming Message Too Big		O	
WCMP-GEN-S-025	able to process incoming Echo Request		O	
WCMP-GEN-S-026	able to process incoming Echo Reply		O	

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Appendix B. WCMP in Different Network Types Supported by WAP (Informative)

Network	*ICMP*	*WCMP*	*Description*
GSM SMS		*	WAP-specific
GSM USSD		*	WAP-specific
GSM CSD	*		Standard
GSM GPRS	*		Standard
FLEX		*	WAP-specific
ReFLEX		*	WAP-specific
TDMA R-data		*	WAP-specific
TDMA CSD	*		Standard
CDPD	*		Standard
CDMA CSD	*		Standard
CDMA SMS		*	WAP-specific
TETRA SDS		*	WAP-specific
TETRA PKT	*		Standard
Mobitex		*	WAP-specific

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Appendix C. Change History (Informative)

Type of Change	Date	Section	Description
WAP-202-WCMP-20000219-a	24-Jun-2001		The used baseline specification.
WAP-202_001-WCMP-20001212-a	12-Dec-2000	2, 5.5.1	Fix normative and informative references. Clarify ICMP type.
WAP-202_002-WCMP-20001213-a	13-Dec-2000	App A	New SCR dependency notation.
WAP-202_003-WCMP-20010319-a	19-Mar-2001	2, 5.4.4	Fix (CDMA) references. Fix handling of CDMA MESSAGE_ID.
WAP-202_004-WCMP-20010426-a	26-Apr-2001	1, 2.1, 5.3, App A, 3.2, 3.3, 5.2, 5.4.7, 5.4	Fix obsolete references. Make references in SCR table more accurate. Use proper format for reference entries and tags. Rephrase static conformance clause. Spell out the WCMP protocol identifier in TETRA. Remove the undefined iDEN SMS mapping.
WAP-202_005-WCMP-20010614-a	14-Jun-2001	2.1, App A	Restructuring and simplification of SCR table.
WAP-202-WCMP-20010624-a	24-Jun-2001		Rolled up all SINs into a new baseline specification.

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